

100 → Struct  
 {  
 102 → Unsigned int a : 1;  
 104 → Unsigned int b : 2;  
 106 → Unsigned int c : 8;  
 } abc

Fig. 1 (Prior Art)

108 → abc.b = value  
 110 → readvalue = abc.b

Fig. 2 (Prior Art)

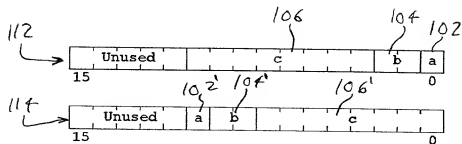


Fig. 3 (Prior Art)

```

116  }
118  } unsigned int abc;
120  } #define MASK_a 0001 // 0000000000000001
122  } #define MASK_b 0006 // 0000000000000110
124  } #define MASK_c 07f8 // 0000011111111000
126  } #define SHIFT_a 0000
128  } #define SHIFT_b 0001
      #define SHIFT_c 0003

```

Fig. 4 (Prior Art)

```

130  } abc = (abc AND ~MASK_b) OR (value << SHIFT_b)
132  } readvalue = (abc AND MASK_b) >> SHIFT_b

```

Fig. 5 (Prior Art)

```

      abc | YYYYYYYYYYYYYYYY ← 134
      ~MASK_b | 111111111111001 ← 136
      abc AND ~MASK_b | YYYYYYYYYYYY00Y ← 138
      value | 0000000000000011 ← 140
      value << SHIFT_b | 0000000000000110 ← 142
(abc AND ~MASK_b) OR (value << SHIFT_b) | YYYYYYYYYYYY11Y ← 144

```

Fig. 6 (Prior Art)

200  
 → #define <name of bit-field> <BFDN>u

Fig. 7

202  
 204  
 BFDN ← LEFT-BIT:RIGHT-BIT

Fig. 8

212  
 Struct  
 {  
     Unsigned long field;  
     #define a 0000u  
     #define b 0201u  
     #define c 1003u  
 } abc  
 206  
 208  
 210

Fig. 9

214  
 Struct  
 {  
     Unsigned long field;  
     #define a 1010u  
     #define b 908u  
     #define c 700u  
 } cba  
 216  
 218  
 220

Fig. 10

222  
 → WRITE\_BITFIELD(abc, b, value)  
 → readvalue = READ\_BITFIELD(abc, b)  
 224

Fig. 11

```

226
→ #define LEFTBIT(BFDN) (BFDN / 100)
→ #define RIGHTBIT(BFDN) (BFDN % 100)
228
→ #define FIELDMASK(BFDN) \
230 (~((fife << (LEFTBIT(BFDN) - RIGHTBIT(BFDN))) << RIGHTBIT(BFDN))

→ #define READ_BITFIELD(ADDRESS, BFDN) \
232 ((ADDRESS AND FIELDMASK(BFDN)) >> RIGHTBIT(BFDN))

→ #define WRITE_BITFIELD(ADDRESS, BFDN, VALUE) \
  (ADDRESS = ((ADDRESS AND ~FIELDMASK(BFDN)) | \
234 ((VALUE << RIGHTBIT(BFDN)) AND FIELDMASK(BFDN)))) \
  \

```

Fig. 12

```

236
238 ADDRESS | abc = YYYYYYYYYYYYYYYY
240 BFDN | b = 0201
242 VALUE | 3 = 0000000000000011
244 LEFTBIT(0201) | 02
246 RIGHTBIT(0201) | 01
248 FIELDMASK(0201):
250 LEFTBIT - RIGHTBIT | 1
252 fife << 1 | 1111111111111100
254 ~(fife << 1) | 0000000000000011
256 ~(fife << 1) << 01 | 0000000000000110
258 WRITE_BITFIELD(abc,b,3):
260 ~FIELDMASK | 1111111111111001
262 abc AND ~FIELDMASK | YYYYYYYYYYYYYY00Y
264 VALUE << RIGHTBIT | 0000000000000110
266 (VALUE << RIGHTBIT) AND FIELDMASK | 0000000000000110
268 ADDRESS | YYYYYYYYYYYYYY11Y

```

Fig. 13